**Third United Nations International Conference on the Peaceful Uses of Atomic Energy**

A/CONF.28/A/458
UNITED ARAB REPUBLIC
February 1964
Original: ENGLISH

Confidential until official release during Conference

**Abstract**

# NEW DEVELOPMENTS IN THE ACCELERATED ISOTOPIC LABELLING OF ORGANIC COMPOUNDS

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Labelled organic compounds are finding increasing useful applications in the scientific, medical, biological and chemical fields as well as in the organic industries. After reviewing previous work, the paper describes new developments in producing these compounds in the laboratory in a matter of a few minutes and points out the method's advantages.

A laboratory microwave generator was used to produce microwave energy of about 12 cm wave length, 2425 MHz frequency and continuously variable power output between 20 and 250 W. This was used as a tool for accelerating exchange reaction, but not ion acceleration, between tritium gas and a variety of anaesthetic and other products to produce unspecific and specific labelling in the order of 50mC/g or more depending on the amount of material. Among these products are carbocaine, procaine, tetracaine, xylocaine and L-cocaine. The energy was concentrated in a spherical specially constructed but simple cavity where the resonance frequency obtained by a tuning device allows an electrodeless discharge to be produced in the reaction tube.

Two new features are stressed upon. The first is the simultaneous recording of the course of reaction. This was achieved by coupling the vacuum gauge to a speedomax pen recorder of 10 mV total range, whereby the change of gas pressure with microwave energy is recorded without interruption. With most of the compounds a decrease of pressure was noted, while with the rest a gradual increase was marked. Conclusions are drawn as to the relative importance of the power of the discharge and the distance of the target material from the plasma zone. The second is the use of a bent tube. The material to be labelled is powdered and mixed with glass-wool in a side bent tube connected to the main tube in which the discharge takes place.

In this way, the material is protected from UV radiation and is far from charged entities. The method is therefore suitable for general labelling including radiation and heat sensitive material as no sparking whatsoever is involved. When this tube is cooled in liquid nitrogen, liquids and condensible gases can also be labelled, as in the cases of benzene and ethylene oxide.

The method is characterized by presence of minimum decomposition products where relatively simple purification techniques are adequate to get radiochemical purity. The results supply further evidence to the atom-molecule mechanism proposed earlier by one of the authors, as no charged particles from the plasma zone are likely to reach the target material in the bent section. Fixation yields and efficiencies are calculated.